PROGRESS

of the

Barberry Eradication Campaign

in

Nebraska in 1930

Black Stem Rust Spread From This Common Barberry Bush To Near-by Grain Fields Causing Severe Damage

Barberry Eradication Pays

Remove the Barberry and Break the Rust Cycle

Spring

Cluster Cup Stage of Rust on Barberry Leaf

Barberry Bush

Winter

Black Stage on Straw, Stubble and Wild Grasses

The Life Cycle of Black Stem Rust

The World's Most Destructive Disease of Wheat, Oats, Barley and Rye

Summer

Red Stage of Rust on Growing Grain. Repeats Every Ten Days

Harvest Time

Black and Red Stages of Rust on Mature Grain

All Common Barberries act as starting points for Black Stem Rust early each spring. By destroying the barberry the early spring source of black stem rust is eliminated. The Common Barberry provides a means to bridge the gap between the black stage on grain in the fall and the red stage of the rust on grains and grasses the following spring.

BOOST BARBERRY ERADICATION—A PRACTICAL RUST CONTROL MEASURE

PROGRESS OF THE BARBERRY ERADICATION CAMPAIGN

IN NEBRASKA, 1930

By M. E. Yount*, Agent,
Office of Barberry Eradication, Bureau of Plant Industry,
United States Department of Agriculture.

Thirteen years have passed since the first organized effort was started in Nebraska and twelve other small grain States to reduce the number and severity of black stem rust epidemics by the eradication of common barberries. Prior to this time plant breeders had been working to produce varieties of grain which would resist the ravages of stem rust. Some progress was made but they found that their task was not an easy one. Varieties of grain were produced which at first appeared to be resistant but later were found to be susceptible to stem rust attack. In recent years it has been found that new forms of rust capable of attacking heretofore rust resistant varieties of grains are produced on the barberry bush. The plant breeders' task of producing resistant varieties will be considerably easier when all of the common barberries are eradicated.

As far back as 1660 a law against the growing of barberries was passed in Rouen, France. Later, laws prohibiting the growing or barberries within specified distances of grain fields, were enacted in most of the countries of western Europe. In our own country, the New England States passed laws against these offending bushes as early as 1726. All of these laws were passed because farmers noticed that stem rust was always more severe in the grain fields near to these bushes than in those some distance away. It was not until 1865 that deBary, a German scientist, definitely proved the relationship between common barberry bushes and black stem rust. Since that time many other investigators have verified the work of deBary so that today there should

---

*Assistant Leader of Barberry Eradication in Nebraska.

be no doubt in the minds of people in regard to the merits of barberry eradication as a control measure for black stem rust.

The barberry eradication campaign was started in Nebraska in April, 1918. During the first two years only a few men were employed for the summer months, largely to make a preliminary survey to determine how many common barberries were growing in the State, and how big a job it would be to get rid of them. The results of this survey were surprising. It was found that Nebraska had a large number of these bushes and that in order to get them out it would be necessary to cover the entire State county by county. However, this did not tell the whole story. It merely gave a vague idea of what was ahead.

To find the greatest number of bushes in the shortest possible time the first survey was done hurriedly. Consequently many bushes were missed, although most of the large hedges and bushes were destroyed on this survey. As the campaign progressed the experience gained resulted in the building up of an organization which has eradicated more than 18 million of these rust-spreading bushes from the thirteen North-Central, grain-growing States. Of this number, approximately 141,000 have been found and destroyed in this State. We are not through yet. Splendid progress is being made, but the task will not be complete until the last barberry bush has been found and destroyed. Until that time we may expect some stem rust every year with the severity depending upon the kind of weather present during the growing season. It also is necessary to get every bush so that the danger of the State being reseeded to barberry bushes will be reduced to a minimum.

Organization of the Campaign

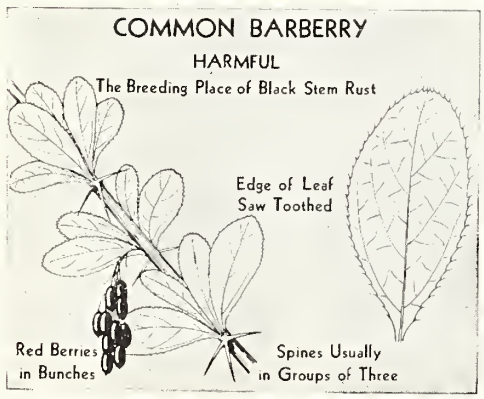
The demand of farmers and others interested in grain-growing, for relief from the ever increasing stem rust epidemics, resulted in legislation against common barberry bushes and the organization of a campaign to find and destroy these bushes. In 1917, North Dakota began the eradication of common barberries and early in 1918, the present organization,

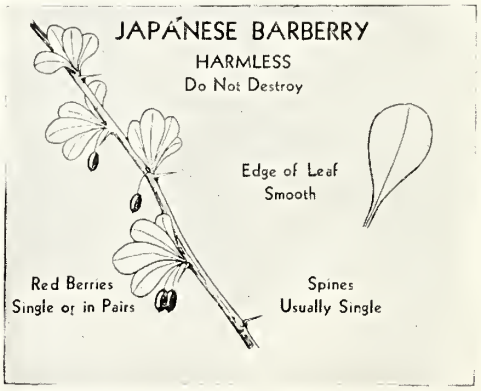
Black Stem Rust

spreads from Common Barberry Bushes to Wheat, Oats, Barley, Rye and many Grasses

Black stem rust of small grains is caused by a tiny parasitic plant. In the Northern States it lives for a time each spring on the leaves of common barberry bushes. The dust-like spores of the rust are spread by the wind for miles from barberry bushes to grain fields and from one grain field to another. Warm, moist weather aids the rapid development and spread of stem rust, just as the growth of corn, wheat, or other crops is affected by favorable weather conditions. Destroy common barberry bushes and reduce losses from stem rust.

Learn to Know Common Barberry





Report common barberry bushes you may find, to the Barberry Eradication Office in your State, your Agricultural College, your State Department of Agriculture, or the Barberry Eradication Office, United States Department of Agriculture, Washington, D.C.

cooperative between the United States Department of Agriculture and the 13 North-Central, grain-growing States, was effected. By 1919 laws or other regulations prohibiting the growing of barberries became effective in each of the 13 States involved in this project.

The barberry eradication campaign in Nebraska is directed by a District Leader under the supervision of the Office of Barberry Eradication, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C., and in cooperation with the Nebraska Agricultural College, the State Department of Agriculture, and other State and civic organizations. The Conference for the Prevention of Grain Rust of Minneapolis, composed of representatives of agricultural and allied interests, cooperates closely with the campaign.

Barberry eradication has been financed largely by Federal funds. Since the beginning of the campaign splendid support and valuable indirect aid have been given by various organizations and institutions within the State. State aid is necessary in order that adequate Federal funds may be received to carry on the eradication in Nebraska. A part of the Federal appropriation must be matched by State funds.

Activities of Barberry Eradication

The barberry eradication campaign consists of more than merely looking for barberry bushes and destroying them when found. There are four major phases of the work: (1) survey, (2) eradication, (3) education, and (4) investigation. It is hard to state which of these is of greatest importance. Each of these is necessary and is dependent upon one another.

Survey, of course, includes the problem of finding every bush in the entire State. It is an immense undertaking which requires not only a corps of trained men but the intelligent cooperation of every man, woman, and child in Nebraska. Every foot of natural and planted timber must be carefully searched before one can say with assurance that no

barberry bushes are present. Several different types of survey are necessary in some sections of the State, because of the fact that new barberry seedlings keep appearing year after year for some time. Seeds from the mother bushes are deposited by birds and by other means, and may then lie dormant for a considerable number of years before they begin to grow.

The eradication of barberries after they have been located is a comparatively easy job. Digging usually will not completely kill them, but common crushed rock salt or kerosene when properly applied around the roots is very effective. When bushes are found by people not thoroughly familiar with eradication methods, it is suggested that they report the location to the Barberry Eradication Office at Nebraska Agricultural College.

Educational activities are extremely important phases of the work. This includes the job of telling the facts regarding barberry and stem rust to the people of the State. Many questions are answered and the work is willingly explained to all. This phase of the program is the major activity during the late fall, winter, and early spring.

The purpose of the educational work is to secure the support and cooperation necessary for a successful survey. The general public must be reached in an effective manner if the work is to be kept before the people of the State. Extensive use has been made of news articles, window displays, exhibits, demonstrations, bulletins, circulars, and circular letters. Talks, many of which are supplemented with lantern slides, film strips, and motion pictures are given at various gatherings.

The chief educational work has been through the schools and colleges of the State. Some work has also been carried on through other organizations such as the 4-H clubs and others. The boys and girls and students in general are taught to recognize the barberry bush and understand the cause, life habits and control of stem rust. The teachers

and instructors are sent lessons plans, bulletins, circulars, charts, specimens, and other material to aid them in their work. Splendid cooperation has been received from the institutions of learing, from the grade school to the university, and especially from the State Department of Public Instruction.

Investigational work, in cooperation with the State experiment stations in the barberry eradication area, provides a means of directing the course of the program, checking the efficiency of the work and determining ways of bringing about improvement. Investigations during past years have resulted in a considerable saving of time and money. Surveys are made each year to determine the prevalence and severity of stem rust and the damage that it has caused to small grain crops. Investigational work to determine the effectiveness of the personnel with an idea toward its improvement has also been carried on.

Problems of Survey, Eradication, and Education

The task of covering a county section by section and being sure that no barberry bushes have been missed, is not an easy matter. In some counties it is almost humanly impossible to survey the territory and be sure that no bushes are missed. Even if this were accomplished there still would be danger of the territory becoming reinfested from the seeds that may be lying in or on the ground. For this reason it will be necessary to make several surveys in some counties before they can be pronounced free of these rust-spreading bushes.

There is also the danger of common barberries being brought into the State from outside sources. A strict quarantine has been established to prohibit the shipping of barberry bushes, yet occasionally some plants are brought into the State without being inspected. The seeds of common barberries are sometimes carried by travelers who are returning to the State. In several instances new bushes have grown up from the seeds brought into the State in this manner.

Some people still believe that the weather is the real cause of rust. It is difficult for them to understand how an innocent looking shrub like a barberry bush can have anything to do with stem rust. Favorable weather is, of course, necessary for the development of stem rust, but the weather itself can never cause the disease. In explaining the life cycle of stem rust, attention should be called to three stages: (1) the red or summer stage is found on the green-growing grain plants; (2) later, or about harvest time, the red pustules of stem rust are replaced by black pustules. This is known as the black stage and is the stage that lives over winter on the grain stubble, wild grasses, and grain straw; (3) in the spring of the year the black pustules begin to grow but in the Northern States usually can not infect the new grains without first growing on the leaves of the common barberry. The stage on the barberry leaves is known as the cluster-cup or spring stage. From this stage the rust is again able to infect the new grains and grasses. Year after year, stem rust development passes through this cycle of growth on the grain and harmful barberry. Destruction of any one of these three stages will reduce stem rust epidemics. It is for the purpose of breaking up this cycle of stem rust development that harmful barberry bushes are being destroyed in the Northern grain-growing States. Every harmful barberry bush destroyed serves to retard development of black stem rust epidemics.

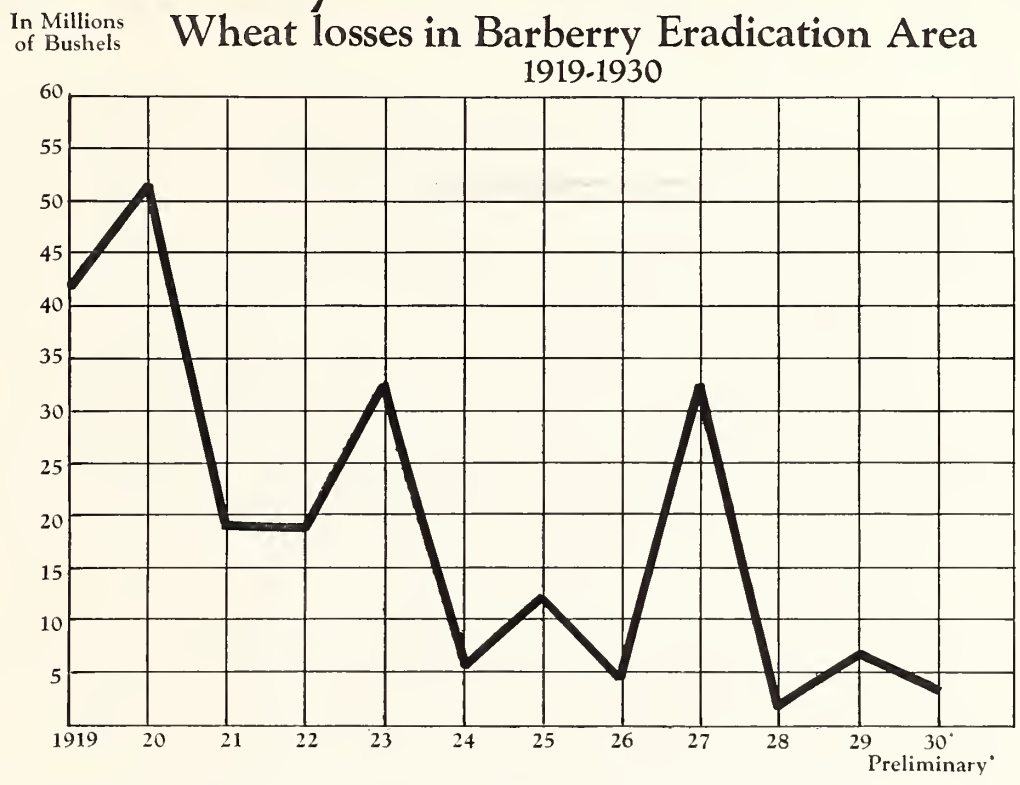
The task of educating the general public relative to the merits of the barberry eradication campaign is a real problem. Considerable progress has been made, but there is a large amount of work ahead before the campaign will be fully understood by people in general.

The above are some of the problems ahead in this project. Many more could be mentioned, but these are typical examples.

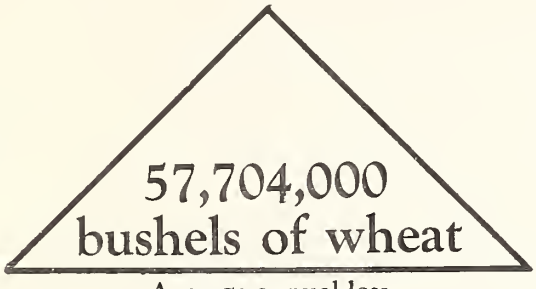
Summary of Progress for 1930

The major phase of the barberry eradication field program in 1930 involved the reworking of certain Nebraska areas. Intensive searches were completed in Scottsbluff,

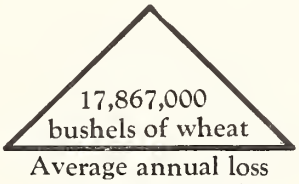
Barberry Eradication Pays



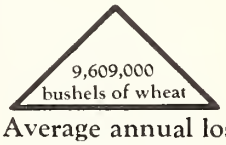
The losses to small grain crops caused by black stem rust have been reduced since the beginning of the barberry eradication campaign in 1918. The breeding of rust-resistant varieties, the use of early maturing varieties, and the sowing of crops early, have aided in this reduction.



Average annual loss
five-year period
1916-1920



Average annual loss
five-year period
1921-1925



Average annual loss
five-year period
1926-1930

Millions of bushels of oats, barley and rye also are damaged each year by black stem rust

Rust shriveled grain always is discounted

Destroy all Common Barberries—Reduce Losses from Stem Rust.
Receive the Highest Available Price for Grain.

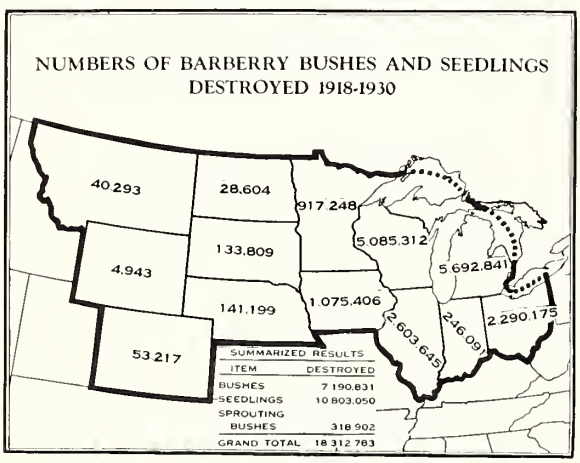
COMMON SALT KILLS BARBERRY BUSHES AND PREVENTS SPROUTING

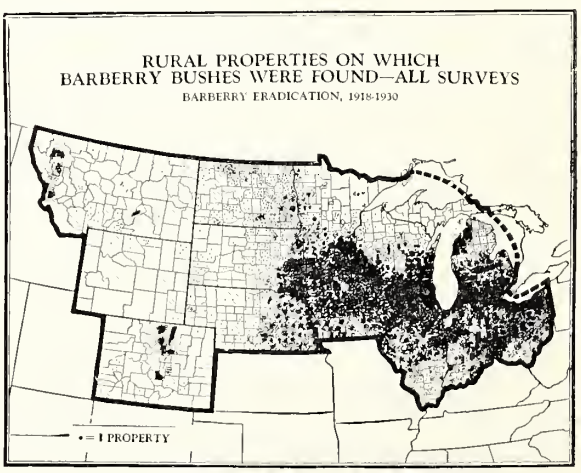
SALTING A BUSH

SPROUTS FROM DUG BUSH

Birds, animals and man chiefly are responsible for the wide distribution of the seeds of common barberries. Every fence row, thicket, pasture or wood is a possible hiding place for these bushes.

Every man, woman and child should consider it his or her duty to look for and report common barberry bushes.





More than 18 million sources of black stem rust were removed 1918-30

Prepared by the Rust Prevention Association, 300 Lewis Building, Minneapolis, Minn., in co-operation with Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D.C.

Morrill, and Howard Counties. Approximately two-thirds of the areas of Sherman, Valley, Greeley and one-half of Box Butte Counties were gone over carefully by field agents.

During the field season 203 large bushes and 6,760 seedlings were found and destroyed on a total of 38 properties. Leads for suspected bushes on several more properties are on hand but time has not permitted checking them.

Importance of sending in reports relative to the locations of harmful barberry bushes and fields heavily infected with stem rust by property owners, county agents, agricultural instructors, and school children, to the Office of Barberry Eradication at the Nebraska Agricultural College, can not be over emphasized. It is only through such cooperation that the largest total number of bushes may be destroyed in the shortest possible time. Every bush destroyed further reduces the probability of black stem rust epidemics.

Through cooperation of the Conference for the Prevention of Grain Rust and the United States Department of Agriculture, educational material concerned with the relation of harmful barberry to stem rust epidemics was placed in the rural schools of Boyd, Holt, Garfield, Valley, Greeley, Sherman, Howard, Nance, Nuckolls, Thayer, Jefferson, Gage, Pawnee, Richardson, Nemaha, Johnson, Otoe and Cass Counties.

The Conference for the Prevention of Grain Rust is presenting a beautiful bronze medal to any boy or girl sending in a twig of harmful barberry to the Barberry Eradication Office, located at the Nebraska Agricultural College, for identification. The sender is required also to give the location of the bush before the medal is granted.

The part these harmful barberries play in serving as infection centers for stem rust epidemics was again conclusively demonstrated in three different counties during the

season of 1930. In Valley and Greeley Counties, wheat, rye, and barley rusted heavily in the vicinity surrounding the properties on which harmful barberry bushes were found. Another example of the spread of stem rust was noted in Scottsbluff County near Haig. Here the rust could be traced for three miles from the offending barberry. The spread of stem rust was very evident in all of these cases which were typical examples of cases that may be found almost every year.

Future Plans

The search for barberry bushes by trained men must continue until every county in the entire State has been carefully covered. It then will be necessary to revisit certain properties and rework certain areas to destroy barberries that have grown from seed since the last survey.

Public interest must be increased so that a constant watch will be kept by the citizens of the State to prohibit new bushes from getting started. More effective educational work is necessary to accomplish this end. People who thoroughly understand the work are usually good supporters. Opposition and lack of interest come from those who are not familiar with the facts regarding the common barberry and stem rust.

Other Control Measures

Barberry Eradication is not the only control measure for stem rust. Several other methods of controlling this disease are important and should receive the attention of every grain grower. No single method will entirely eliminate black stem rust, but a combination of all of them will reduce the losses to a point where they will be of no serious consequence.

It is definitely known that certain varieties of wheat, oats, and barley ordinarily do not rust so much as

other varieties. These rust-resistant crops should be grown if they are desirable from the standpoint of yield, milling quality, resistance to other plant diseases, and if they are of good market value. Unfortunately no rust-proof grain has yet been found. Plant breeders have been working on this problem for years and have made excellent progress, considering the many difficulties encountered. The search for resistant grains should be encouraged along with barberry eradication.

The production of rust-resistant varieties of grains probably will be much more successful, however, when all common barberry bushes have been eradicated. The reason for this is shown in the recent important discoveries made in the Canadian Rust Research Laboratories at Winnipeg, Manitoba, and by E. C. Stakman and his co-workers at the University of Minnesota. Both of these groups, conducting independent research, proved that entirely new strains of the destructive stem rust are produced if two different forms of the rust cross-breed on the barberry leaves. The certainty that new forms of the dangerous disease may appear suddenly, makes the eradication of the common barberry all the more imperative, since it is on the barberry alone that this crossing can occur in nature. The new and apparently resistant varieties of grains are not safe with barberries near. If for no other reason than to protect the new kinds of super wheat which are now in the process of being developed, all common barberry bushes should be destroyed.

Two ways of preventing excessive losses from stem rust also are recommended. These are: (1) The sowing of crops as early as possible in the spring; and (2) the sowing of varieties that mature early. When crops ripen early, either because they have been sown early or because the particular variety normally ripens early, stem rust usually causes little damage.

Control Measures for Other Rusts

There are more than 2,000 species of plant diseases known as rusts. Barberry eradication will not control all of these rusts, but it will materially reduce the damage caused by black stem rust, which is the most destructive cereal disease in this State.

A rust known as orange-leaf rust appears on wheat in Nebraska nearly every year. In some seasons this disease causes serious damage. It may be easily distinguished from stem rust. The rusty spots occur more commonly on the leaves. They are orange in color and circular in shape. Stem rust occurs commonly on the stem in oblong spots brick-red to dark-red in color.

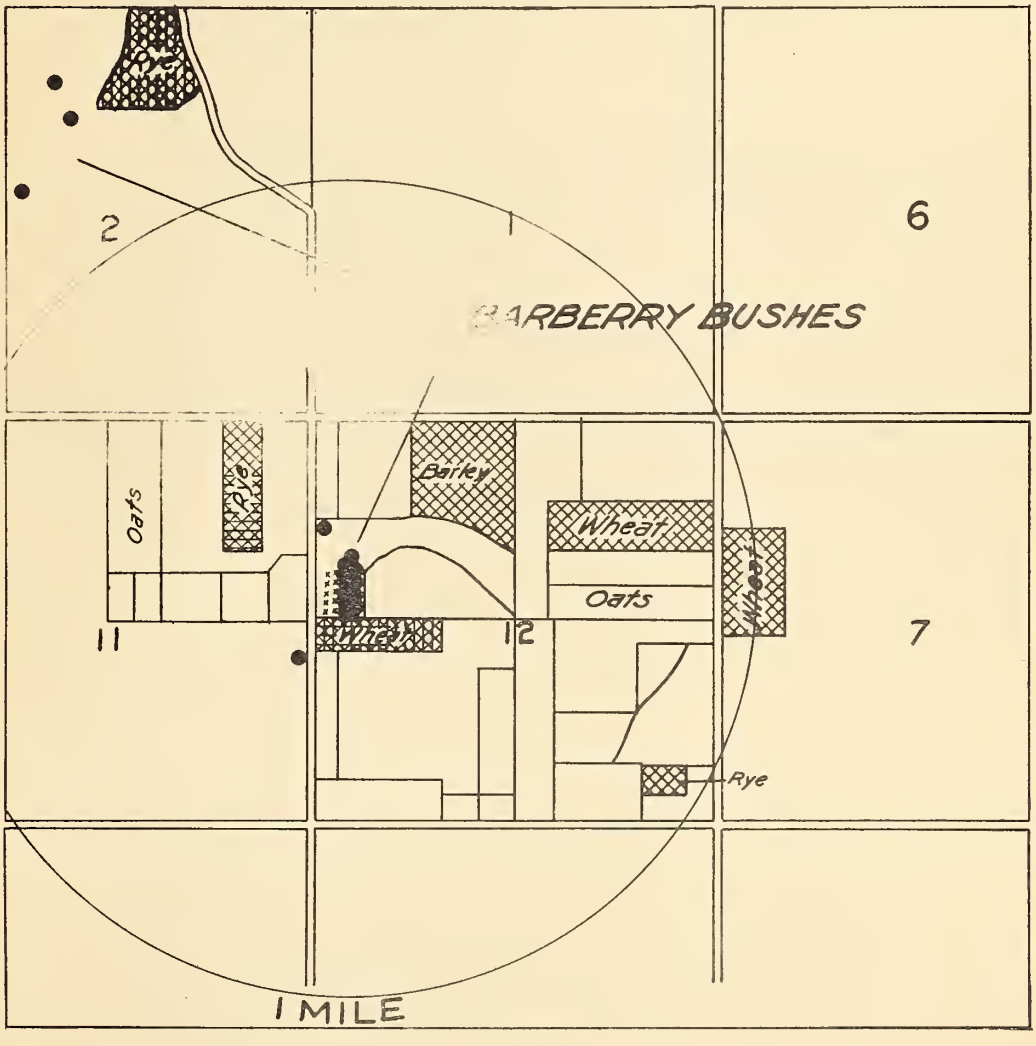
There also is a leaf rust of oats which may cause considerable loss. In addition there are leaf rusts of rye and barley. In some seasons a disease known as flax rust causes serious damage to the flax crop.

It should be thoroughly understood that barberry eradication will control only stem rust. The other rusts must be controlled by different methods. The breeding of varieties of crops resistant to these diseases gives the greatest promise for control.

Conclusion

It is fortunate for the people of Nebraska that the campaign to eradicate common barberries was started twelve years ago. Every year the situation was getting worse. Stem rust epidemics were common; losses were severe. The barberry bushes present were producing quantities of seeds every year which were being distributed about the State causing the number of bushes to increase rapidly. In certain Eastern States outside the area barberries are plentiful, in places growing so thick as to choke out pasture lands in unplowed land. The situation here would have been similar if the bushes had continued to grow ummolested for a few more years. As it is, Nebraska will eventually be free of common barberry bushes, sooner, perhaps, than some of the Eastern grain-growing States.

STEM RUST SPREADS
FROM COMMON BARBERRY TO GRAINS AND GRASSES
VALLEY COUNTY, NEBR.
JULY, 1930.



N
W E
S

DEGREES OF INFECTION

Trace Light Moderate Heavy

B.E.1459

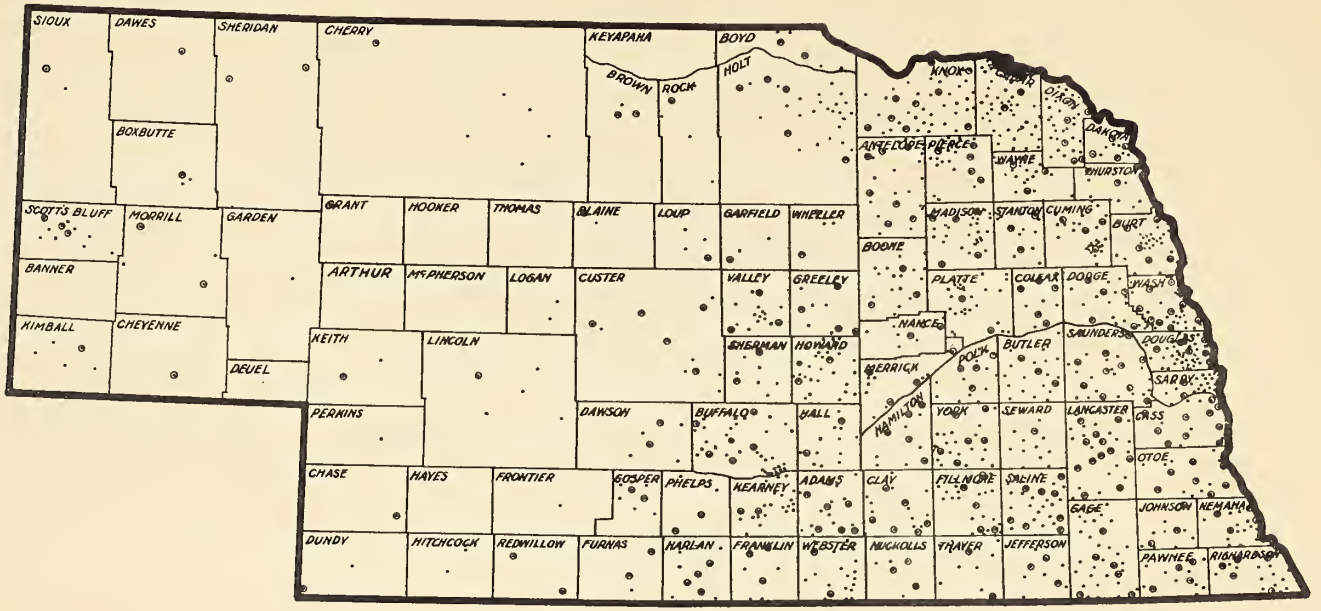
Barberry eradication is a safe and sane sanitation measure. As no progressive livestock farmer would voluntarily allow an animal affected with tuberculosis to remain in his herd, neither should he permit a common barberry to grow on his farm or in his community. One small barberry bush not only may start an epidemic of stem rust, but in time it will cause the entire community to become reinfested with additional rust-spreading bushes. Therefore, this campaign will not be completed until the last common barberry bush has been found and eradicated.

Every citizen may help by reporting to the Office of Barberry Eradication, located at the Nebraska Agricultural College, Lincoln, (1) any bushes that he suspects of being harmful barberry, and (2) grain fields he knows to be heavily infected with black stem rust.

Acknowledgement is also made to E. A. Lungren, in Charge of Barberry Eradication in District No. 3 and R. O. Bulger, in Charge of Barberry Eradication in District No. 2, for their contribution to this report.

PROPERTIES HAVING BARBERRY BUSHES 1918-1930

NEBRASKA

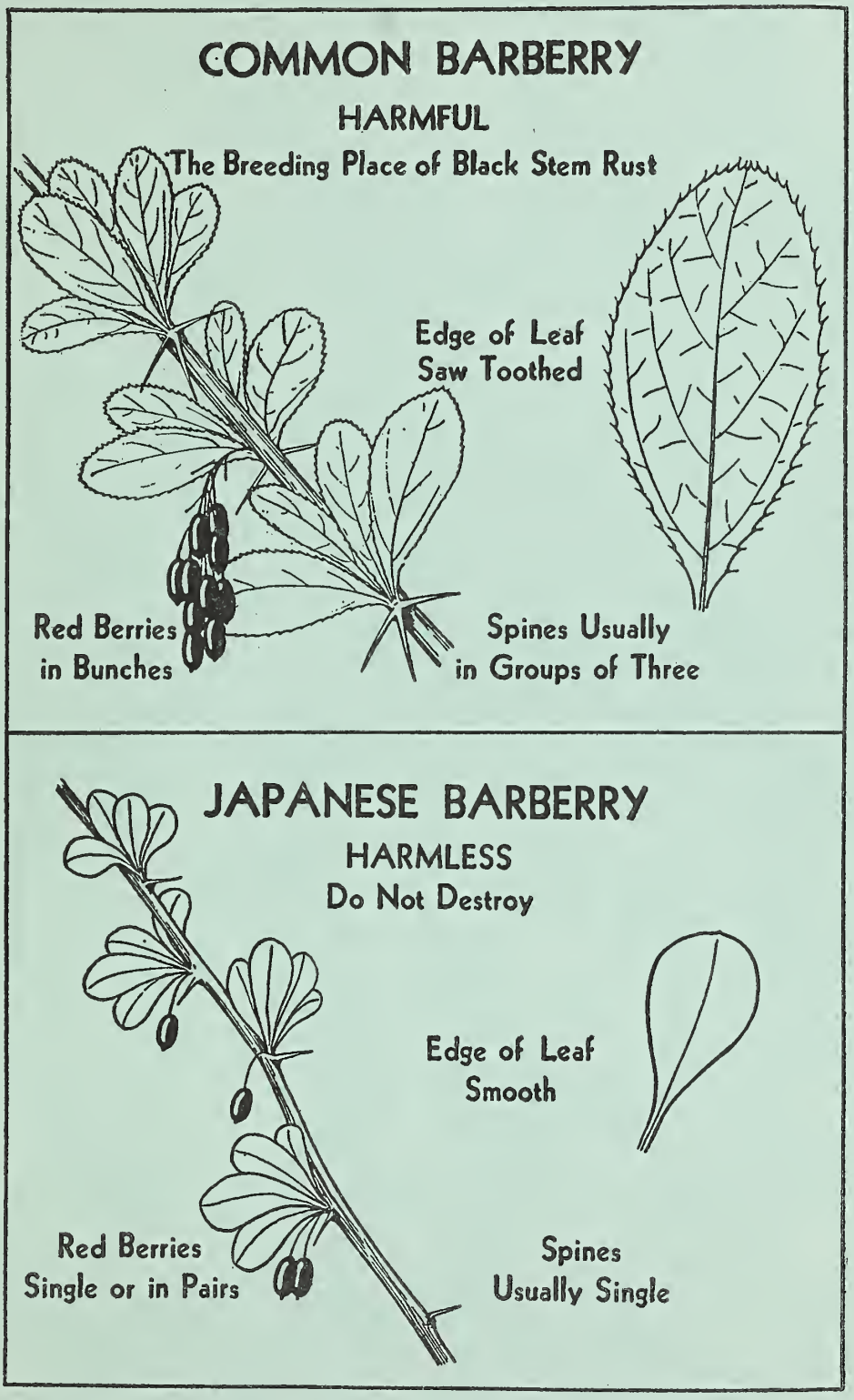


4,249 PROPERTIES
141,199 BUSHES

· FARMS HAVING BARBERRY BUSHES
· TOWNS HAVING BARBERRY BUSHES

BE-1426

Common Barberry Spreads Black Stem Rust



Look For and Report All Common Barberry Bushes

To the State Leader of Barberry Eradication, in care of your State Department of Agriculture or your State Agricultural College.

Common Barberry Bushes

spread

Black Stem Rust

to

WHEAT, OATS,
BARLEY, RYE,
and Many Wild
Grasses

THIS Progress Report is prepared and printed by the Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C. The cover is furnished by the Conference for the Prevention of Grain Rust, 300 Lewis Building, Minneapolis, Minnesota.